Claims

Claims 1–15. (canceled)

16. (currently amended) A method for detecting hydrogenous materials comprising the steps of:

a. directing a stream of fast neutrons from a neutron source toward a target;

b. detecting [[the]] a time when said stream of fast neutrons is emitted from said neutron source;

c. measuring a portion of said stream of fast neutrons that is backscattered from hydrogen in said target after a time delay beginning when said stream of fast neutrons is emitted from said source; and

d. communicating said measurement to a user.

17. (original) The method as recited in claim 16, wherein said measuring occurs after said time delay and only during a window.

18. (original) The method as recited in claim 16, further comprising the step of pulse-height discriminating said measurement.

19. (original) The method as recited in claim 18, wherein said discriminating is performed using an upper level discriminator setting.

20. (original) The method as recited in claim 16, wherein said target comprises an explosive.

21. (withdrawn) The method as recited in claim 16, wherein said explosive is a land mine.

22. (original) The method as recited in claim 16, wherein said explosive is unexploded ordinance.

23. (withdrawn) The method as recited in claim 16, wherein said target is contraband narcotics.

24. (withdrawn) The method as recited in claim 16, wherein said target is biological tissue.

25. (currently amended) A method for detecting hydrogenous materials, comprising:

a. interrogating a target with neutrons from a neutron source and providing a timing signal indicative of the interrogating;

b. receiving neutrons scattered from said target with a neutron sensor and producing a neutron count signal dependent on [[the]] an amount of hydrogenous material present in said target; and

c. based on said timing signal, enabling said neutron sensor after a time delay to discriminate against detecting fast neutrons that have not been scattered from hydrogenous materials in the target.

26. (original) The method of claim 25 wherein said neutron sensor is enabled during a window and disabled after said window.

27. (original) The method of claim 25 further comprising discriminating against neutrons having energies above a predetermined level as detected by the neutron sensor.

28. (original) The method of claim 25 further comprising spatially resolving said neutron count signal.

29. (currently amended) A method comprising:

a. providing a stream of fast neutrons directed toward a target;

b. providing at least one sensing head comprising a neutron sensor and a neutron shield positioned such that a backscattered portion of said stream of fast neutrons is ~~backscattered from said target to~~ contacts said neutron sensor;

c. disabling said neutron sensor during a time delay beginning ~~at the time~~ when said stream of fast neutrons is emitted from said neutron source; and

d. enabling said neutron sensor after said time delay to produce a neutron count signal dependent on [[the]] an amount of hydrogenous material present in said target.

30. (original) The method of claim 29 wherein said enabling is for a window, the method further comprising disabling said neutron sensor after said window.

31. (original) The method of claim 29 further comprising processing said neutron count signal with a pulse-height analyzer having at least one pulse-height discriminator setting.

32. (original) The method of claim 31 wherein said at least one pulse-height discriminator setting is an upper level discriminator setting.

33. (currently amended) The method of claim 29 further comprising spatially resolving said neutron count signal so that [[the]] a spatial location of said target can be determined.

34. (original) The method of claim 33 wherein said resolving is with a collimating material.

35. (withdrawn) The method of claim 33 wherein said resolving is with a coded-array aperture.

36. (original) The method of claim 29 wherein providing said stream of fast neutrons includes providing a neutron source selected from the group consisting of a fission source, an (alpha, n) source, a (gamma, n) source, and combinations thereof.

37. (original) The method of claim 36 wherein said neutron source comprises ^{252}Cf.

38. (withdrawn) The method of claim 29 wherein providing said stream of fast neutrons includes pulsing a neutron source.

39. (original) The method of claim 29 wherein providing said stream of fast neutrons includes providing a neutron sensor comprising a material selected from the group consisting of ^{3}He, ^{10}B, ^{6}Li, and combinations thereof.

40. (original) The method of claim 29 wherein said neutron sensor is selected from the group consisting of a ^{3}He gas-proportional counter, a $^{10}BF_3$ gas-proportional counter, a scintillating glass containing ^{6}Li, a scintillating glass containing ^{10}B, a scintillating plastic containing ^{6}Li, a scintillating plastic containing ^{10}B, a scintillating crystal containing ^{6}Li, a scintillating crystal containing ^{10}B, and combinations thereof.

41. (original) The method of claim 29 wherein said neutron shield comprises a material selected from the group consisting of ^{10}B, ^{6}Li, and combinations thereof.

42. (currently amended) The method of claim 29 further comprising supporting said sensing head away from a vehicle with an extension [[arm]] arm.

43. (original) The method of claim 29 further comprising communicating said neutron count signal to a user interface.

44. (original) The method of claim 16 wherein said time delay is at least about 70 ns.

45. (original) The method of claim 25 wherein said time delay is at least about 70 ns.

46. (original) The method of claim 29 wherein said time delay is at least about 70 ns.

Claims 47–51. (canceled)